1980 michigan forest pest report

1980 Michigan Forest Pest Report

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INTRODUCTION

Progress continued during 1980 toward developing the Michigan Cooperative Forest Pest Management Program into a more useful and practical tool for the forest manager. This is the objective of the program, to help the land manager make the best possible management decisions.

The most important program development during the year was the transfer of Regional Pest Management Specialist, Bob Heyd, from Roscommon to Marquette. This made possible a truly statewide program with continued progress in implementing pest management practices in the field. One of the primary ways this was accomplished was through the interaction of the Regional Pest Management Specialists with the Operations Inventory System.

Among the many program activities during the year, one of the most important was the leadership role that the Michigan Cooperative Forest Pest Management Program took in developing a pest management handbook for forest land managers. The title of the handbook will be, "Practical Forest Pest Management: A Manual For Controlling Forest Pests Through Forest Management In The Lakes States". If development goes according to plan, the manual should be distributed sometime in 1982.

We would like to thank everyone for their cooperation in 1980, and look forward to a good year in 1981.

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PEST CONDITIONS

LOWER PENINSULA

INSECTS

JACK PINE BUDWORM (Choristoneura pinus)

The population that began to build last year increased to outbreak levels during 1980. Areas that were moderately defoliated last year received severe defoliation this year. In addition, the outbreak expanded into new areas and is now scattered throughout most of the jack pine type. Over 83,000 acres were defoliated (see map). The defoliation classes are defined as follows:

EXTREME...	100% of new growth	75+% of old growth	90+% of total growth
HIGH.....	100% of new growth	50+% of old growth	75+% of total growth
MODERATE..	100% of new growth	some of old growth	50+% of total growth
LIGHT.....	50+% or less of new growth	none of old growth	40+% or less of total growth

Some top-kill and tree mortality will occur in the areas that sustained heavy or severe defoliation. The outlook for 1981 is for continued expansion and increased severity of the outbreak.

Permanent plots will be established next year to monitor the insect population and tree damage. This information will help the regional Pest management Specialist in his efforts to assist land managers in reducing budworm impact by adjusting cutting practices and rotation ages.

ELM SPANWORM (Ennomos subsignarius)

A small infestation last year in Otsego County expanded throughout much of the northern hardwood type in the Northern Lower Peninsula. The beech was almost totally defoliated and basswood, birch, and elm were also damaged. An aerial survey detected nearly 475,000 acres of defoliation (see map). Past experience has shown that serious beech mortality can occur after only one year of severe defoliation. These areas should be watched next year and salvage operations considered, if necessary.

ASPEN LEAFROLLER COMPLEX

This complex of leafrollers, consisting primarily of Choristoneura conflictana (Large Aspen Tortrix) and Anacampsis sp., was responsible for widespread defoliation of aspen throughout most of the Northern Lower Peninsula (see map). Much of the defoliation was very heavy or severe and some top kill and tree mortality were reported in offiste stands. Another heavy year is expected in 1981.

ZIMMERMAN PINE MOTH (Dioryctria zimmermani)

For the second year this insect has been observed in outbreak numbers attacking the leaders and shoots of pole-sized red pine. A very heavy infestation was detected on 500 acres in northeastern Grand Traverse County and 40 acres in Kalkaska County. In addition, 6,000 acres of light to moderately damaged red pine were detected. In some plantations, where attacks have been repeated for several years, the trees are beginning to have a bushy appearance. This is a new problem for us and a thorough evaluation of the situation is being planned to determine the possible impact.

RED PINE NEEDLE MIDGE (Thecodiplosis piniresonasae)

Damage was not as heavy as it was during 1979, but the outbreak spread over a larger area. Light to moderate browning of needles on red pine was observed throughout much of the Northern Lower Peninsula. At this time, it doesn't appear the midge is having a serious impact but the problem will continue to be monitored.

PINE SPITTLEBUG (Aphrophora parallela)

During the past few years, this insect has been associated with the detioration of Scotch pine plantations throughout the Lower Peninsula. In some cases jack pine has also been damaged. The hardest hit stands are pole-sized Scotch pine growing on a poor site; either too dry or too wet. Many times the entire plantation dies. An evaluation of this problem is being planned.

PINE ROOT COLLAR WEEVIL (Hylobius radicis)

More severe infestations are being found each year in an expanding area in the Northwestern Lower Peninsula. The weevil is beginning to be a problem on polesized red pine in the Pere Marquette State Forest. A cooperative project is planned in 1981 with the Canadian Insect Lab at Sault Ste. Marie to test several insecticides for effectiveness in controlling adult weevils.

SARATOGA SPITTLEBUG (Aphrophora saratogensis)

Damage from past outbreaks has been substantial in many plantations, but current annual losses are low. Insect populations were down from last year in most stands surveyed. Most red and jack pine plantations had populations so low that another evaluation survey will not be needed for 2 to 3 years. A frost at the critical time this spring apparently set back the nymphal population. Surveys to assess loss in damaged plantations continued during 1980.

GYPSY MOTH (Lymantria dispar)

During 1980, the Michigan Department of Agriculture and U.S.D.A., Animal and Plant Health Inspection Service continued their cooperative gypsy moth program.

A total of 30,366 acres were treated with Dimlin in Isabella, Clare and Mecosta counties. In addition, 1,600 acres were treated with Sevin in Calhoun and Van Buren counties. In Montcalm county, 400 acres were treated with Disparlure in an attempt to reduce mating and reduce population level.

The trapping program consisted of setting out 37,500 traps. New counties with moth catches in the Lower Peninsula were; Grand Traverse, Roscommon, Ogemaw, Iosco, Genesee, and St. Clair. Grand Traverse and St. Clair counties were single moth catches.

DISEASES

OAK MORTALITY

Oak was reported dying in scattered patches and blocks throughout much of the Northern Lower Peninsula. Some of the hardest hit counties were Roscommon, Crawford, Oscoda and Lake. Shoestring root not (*Armillaria mellea*) and two-lined chestnut borer (*Agrilus bilineatus*)were the two pests most frequently found associated with the oak mortality. The oak had been stressed by draught and defoliation by the oak leaf roller (*Archips semiferanus*). Both of the stress factors have tapered off and the oak mortality should decrease over the next three to five years. Many of the trees are being salvaged for firewood.

PINEWOOD NEMATODE (*Bursaphelenchus lignicolus*)

This nematode was found for the first time in Michigan in Kalkaska County. The specimen was taken from a dying white pine. The tree had advanced root rot caused by *Armillaria mellea* and it appeared that the nematode could have been a secondary invader.

This pest has recently been discovered throughout much of the United States and most of the time has been associated with urban or shade tree situations. It is not known whether the pinewood nematode will become a significant forest problem in Michigan as it has in Japan.

WHITE PINE BLISTER RUST (*Cronartium ribicola*)

Heavily infected white pine plantations were detected in Kalkaska and Grand Traverse counties. Most of the cankers were low on the stem near the ground line.

OAK WILT (*Ceratocystis fagacearum*)

The incidence of this disease remained at about the same level as previous years. An infection was found in Manistee County for the first time.

ASPEN DISEASES

Surveys have detected what appears to be an increase in the incidence of Hypoxylon canker (Hypoxylon mammatum) and white trunk rot (Phellinus igniarius) on aspen in the Northern Lower Peninsula. Much of this problem is due to large areas of overmature aspen which will be reduced with an upswing in demand and harvest.

SHOESTRING ROOT ROT (Armillaria mellea)

Pockets of dead trees were detected in pine plantations scattered through parts of the Northern Lower Peninsula. Most of the root rot pockets could be associated with some type of stress.

MAPLE DECLINE

This is primarly a problem on sugar maple and appears to be increasing in severity in the Northwestern Lower Peninsula. Trees exhibiting diebark and decline can be found in towns, parks, along roads and sometimes in woodlots. No single cause has been found responsible, but many of the trees appear to be affected by manganese deficiency.

MISCELLANEOUS

ANIMAL DAMAGE

Porcupine damage was observed during a survey of jack pine plantations in Kalkaska and Grand Traverse counties. Feeding by the animals resulted in top kill, deformity and some tree mortality.

Serious damage to hardwood reproduction and saplings, as a result of elk feeding, was reported in Otsego County.

OTHER INSECTS & DISEASES IN THE LOWER PENINSULA (1980)

INSECT	HOST	COUNTIES	REMARKS
Cicada/Tree-Plant Hoppers Magicicada septendecim Fulgoridea; Membracidae	Aspen, Oak	Emmet, Oscoda, Lake	Very heavy in these counties, but present Regionwide
Oak Skeletonizer	Oak	Cheboygan, Presque Isle	Light population on oaks
Spruce Budworm Choristoneura fumiferana	Balsma Fir, Spruce	Charlevoix, Emmet, Otsego, Montmorency	Scattered ligh infestations
Pine Tussock Moth Dasychira pinicola	Red Pine	Cheboygan	Single individual found
Eastern Pine Shootborer Eucosma gloriola	Red Pine	Grand Traverse, Lake Wexford	Light infestation often in association Zimmerman pine moth damage
Bark Beetles Ips. spp.		Regionwide	Small areas infested in trees stressed by drought or other factors
Red-Headed Pine Sawfly Neodiprion lecontei	Red & Jack Pines		Traditional infestation centers surveyed did not show any insects
European Pine Sawfly Neodiprion sertifer	Pines	Regionwide	The second year of high populations pest
Introduced Pine Sawfly Diprion similis	Red Pine	Wexford, Benzie	Some isolated colonies were located on and USFS lands
Oak Leafroller Archips semiferanus	Oak	Roscommon, Crawford Ogemaw, Lake	Population very low compared to last
Fruit Tree Leafroller Archips argyrosphilus	Northern Hardwoods	Kalkaska	Moderately defoliated 100 acres of hardwoods
Sclerroderris	Red Pine		Although all "possible" reports are investigated, no new infestations have been found

UPPER PENINSULA

INSECTS

SPRUCE BUDWORM (Choristoneura fumiferana)

In general, the outbreak continued at about the same level during 1980 as in previous years. Top-kill and tree mortality continued to occur in areas that have been defoliated for several years.

An aerial survey of state and private land detected 306,010 acres of current spruce budworm defoliation. This included 62,980 acres of light defoliation, 134,970 acres of moderate defoliation, and 108,060 acres of heavy defoliation. In addition, 391,590 acres beyond salvage were mapped. Acres of budworm damage by defoliation class, beyond salvage, landownership and county are presented on page 10. The locations of spruce budworm damage by defoliation class and beyond salvage are shown on the following maps.

The defoliation classes are defined as follows:

Light-A noticeable reddish-brown hue; less than 50 percent defoliation; no dead tops.

Moderate-Obvious reddish-brown hue; greater that 50 percent defoliation; less than 10 percent dead tops and/or trees.

Heavy-Striking reddish-brown hue; greater than 10 percent dead tops and/or trees.

Beyond Salvage-Balsam fir component of stand mostly dead, residual stand threatened little by spruce budworm induced tree mortality.

JACK PINE BUDWORM (Choristoneura pinus)

Light defoliation of jack pine occured in the Panola Plains area in Iron County. Populations were down from last year. Surveys throughout the Upper Peninsula failed to detect any other areas of budworm defoliation.

COUNTIES SURVEYED	PRIVATE LAND DEFOLIATION CLASS				STATE LAND DEFOLIATION CLASS			
	LIGHT	MEDIUM	HEAVY	BEYOND SALVAGE	LIGHT	MEDIUM	HEAVY	BEYOND SALVAGE
Alger (West)	1,940	8,000	400	---	2,240	1,600	---	---
Baraga	5,400	11,680	960	---	3,040	5,680	640	---
Chippewa (West)	---	1,720	---	21,120	---	960	---	15,680
Chippewa (Central)	---	---	7,040	30,800	---	---	4,660	22,400
Chippewa (East)	---	---	4,160	200	---	---	4,800	640
Delta (West)	12,980	1,400	---	---	2,020	1,700	---	---
Delta (East)	---	800	320	3,020	---	740	2,400	4,030
Dickinson	3,360	7,020	640	---	7,960	9,840	5,140	---
Iron (East)	3,590	12,470	5,820	320	4,030	12,580	7,120	1,600
Luce	---	680	5,520	37,760	---	980	11,840	26,560
Mackinac (West)	---	500	6,160	7,020	---	480	4,860	23,520
Mackinac (East)	---	---	2,240	13,440	---	---	400	2,880
Marquette (North)	1,280	6,300	5,920	---	160	1,600	1,080	---
Marquette (SW)	---	---	4,800	9,920	---	880	5,760	10,240
Marquette (SE)	2,720	14,120	820	80	4,000	8,240	4,800	160
Menominee (North)	920	1,300	640	---	1,160	960	---	---
Menominee (South)	1,300	660	960	---	1,960	2,720	640	---
Schoolcraft (North)	---	680	1,760	9,160	---	760	1,280	45,580
Schoolcraft (South)	1,600	11,520	1,920	1,400	1,280	6,320	2,560	4,060
TOTALS	35,120	78,930	50,080	134,240	27,850	56,040	57,980	157,350

TOTAL ACRES DEFOLIATED = 306,010
TOTAL ACRES BEYOND SALVAGE = 291,590

ELM SPANWORM (Ennomos subsignarius)

Moderate to heavy defoliation of beech and sugar maple was detected on over 61,000 acres in Luce, Alger, and Schoolcraft counties (see map). This is the second or third year of defoliation for some of the areas and top dieback or tree mortality could occur. However, it appears that the population is collapsing because many virus killed larvae and parasitized pupae were found.

ORGANGE HUMPED MAPLEWORM (Symmerista lencitys)

Light defoliation of sugar maple was observed in Dickinson County. Periodic outbreaks of this insect have occurred in the past and it is possible that populations may be building again.

MAPLE TRUMPET SKELETONIZER (Epinotia aceriella)

This is another defoliator of sugar maple that has been observed in increasing numbers in Dickinson and Iron counties. It was often found in associaton with the orange humped mapleworm.

BIRCH LEAFMINER (Fenusa pussilla)

Leafminer population have remained high for the past 10 years over much of the Upper Peninsula. During 1980, defoliation ranged from 10 to 90 percent. After many years of heavy defoliation, top-kill and scattered tree mortality are beginning to occur.

BIRCH SKELETONIZER (Bucculatrix canadensisella)

The problems on birch were compounded by this pest. Many trees that had leaves remaining after defoliation by the leaf miner lost them to the birch skeletonizer. The two insects working together were responsible for 100 percent defoliation in many areas.

LARCH SAWFLY (Pristiphora erichsonii)

This insect was responsible for light to moderate defoliation of scattered larch stands. This level of damage has been occuring for several years but there seems to be very little impact.

RED-HEADED PINE SAWFLY (Neodiprion lecontei)

Several isolated colonies were detected in two red pine plantations in Delta County. This situation will be watched closely because this insect can cause serious tree mortality. The last major outbreak in the Upper Peninsula was in the late 1960's.

PINE ROOT COLLAR WEEVIL (Hylobius radicis)

A heavy infestation of this insect was found in a Scotch pine plantation in Marquette County. The root collar weevil is not widely distributed in the Upper Peninsula so this situation will be watched closely.

GYPSY MOTH (Lymantria dispar)

This insect was detected for the first time in the Upper Peninsula during 1980. Single male moth catches were made in Chippewa, Luce, Schoolcraft, and Menominee counties. The Michigan Department of Agriculture will follow up with more intensive trapping in these counties in 1981.

DISEASES

SCLERODERRIS CANKER (Gremmeniella abietina)

The incidence of this disease continued at a low level since the major flare-up in 1978. A survey of the Danaher Plains in Luce and Schoolcraft counties failed to detect any serious damage during 1980.

DUTCH ELM DISEASE (Ceratocystis ulmi)

The disease is present throughout the Upper Peninsula with scattered pockets of elm still surviving.

GALL RUST

A light infection of an unidentified gall rust on jack pine was discovered in Wyman Nursery during the fall of 1980. During 1981, an effort will be made to identify the rust, determine the level of infection, and develop a control strategy if needed.

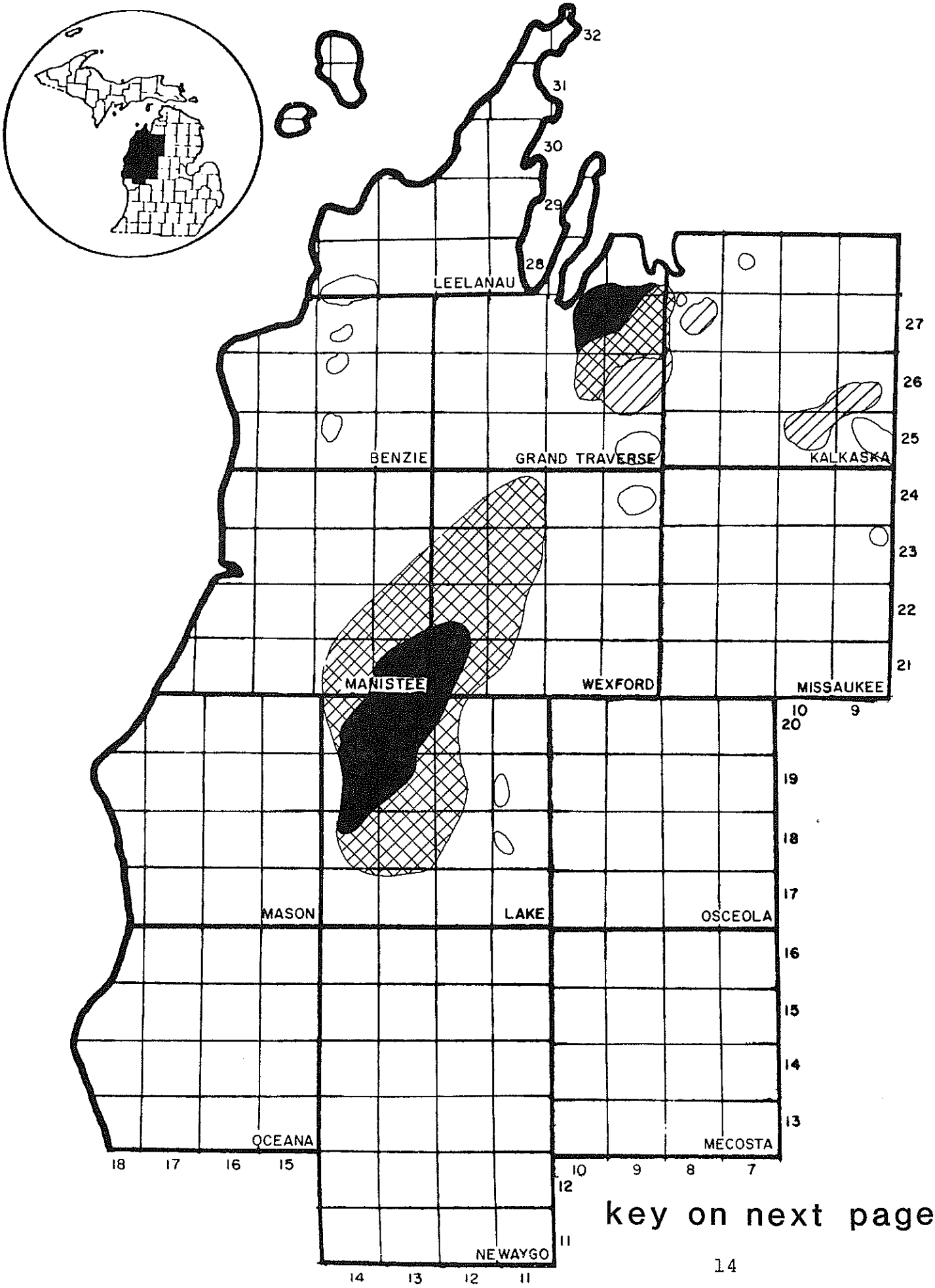
WHITE TRUNK ROT (Phellinus igniarius)

This rot is a problem on many acres of mature and over-mature aspen in the Upper Penisnula. This situation is the result of little demand for aspen in many areas. Until markets pick up, the problem will continue and become worse as age distribution skews toward older trees.

CYTOSPORA CANKER (Cytospora chrysosprerma)

A forty acre aspen stand that was heavily infected with cytospora canker was found in Marquette County. It appeared that the cankers came in after the trees had sustained severe winter sunscald injury on the southwest face of the stems. The stand had an adequately stocked understory of jack pine and the decision was made to remove the aspen and convert to pine.

Jack Pine Budworm Defoliation, 1980



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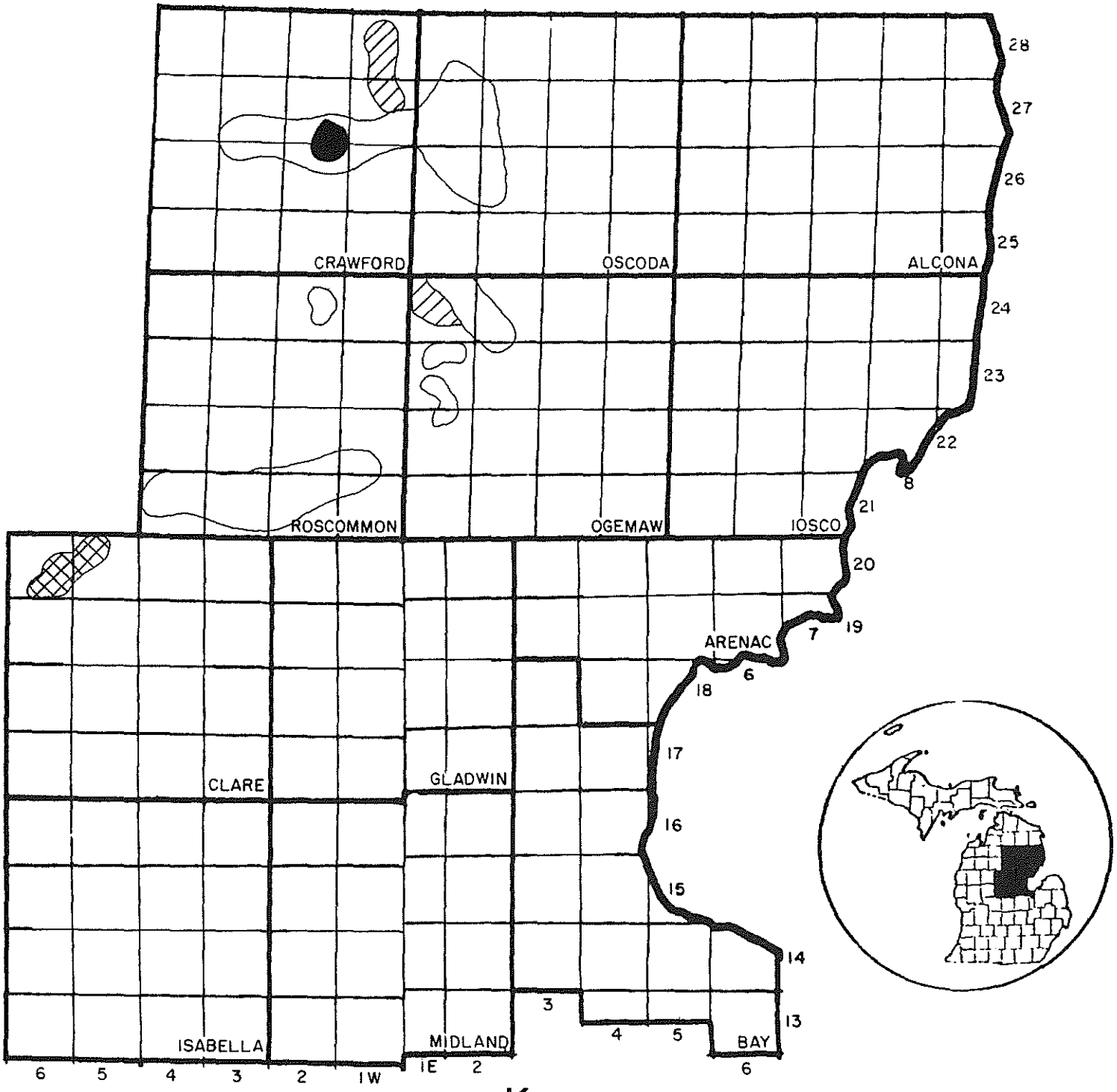
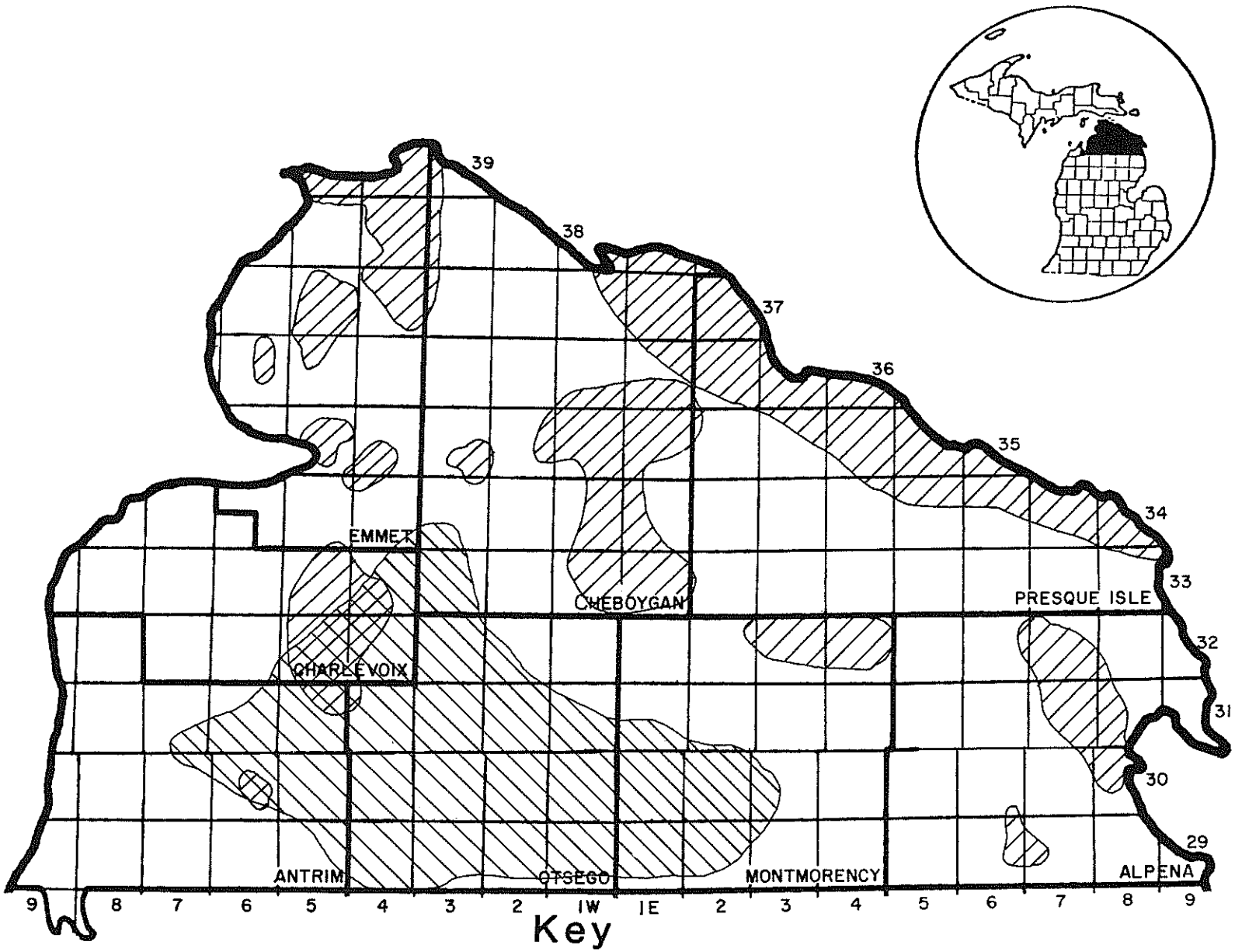
Jack Pine Budworm Defoliation, 1980



Key

- light defoliation
- moderate defoliation
- heavy defoliation
- extreme defoliation

Aspen Leaf Rollers and Elm Spanworm Defoliation, 1980



Aspen Leaf Rollers and Elm Spanworm Defoliation, 1980

LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
MANISTEE
WEXFORD
MISSAUKEE
MASON
LAKE
OSCEOLA
OCEANA
NEWAYGO

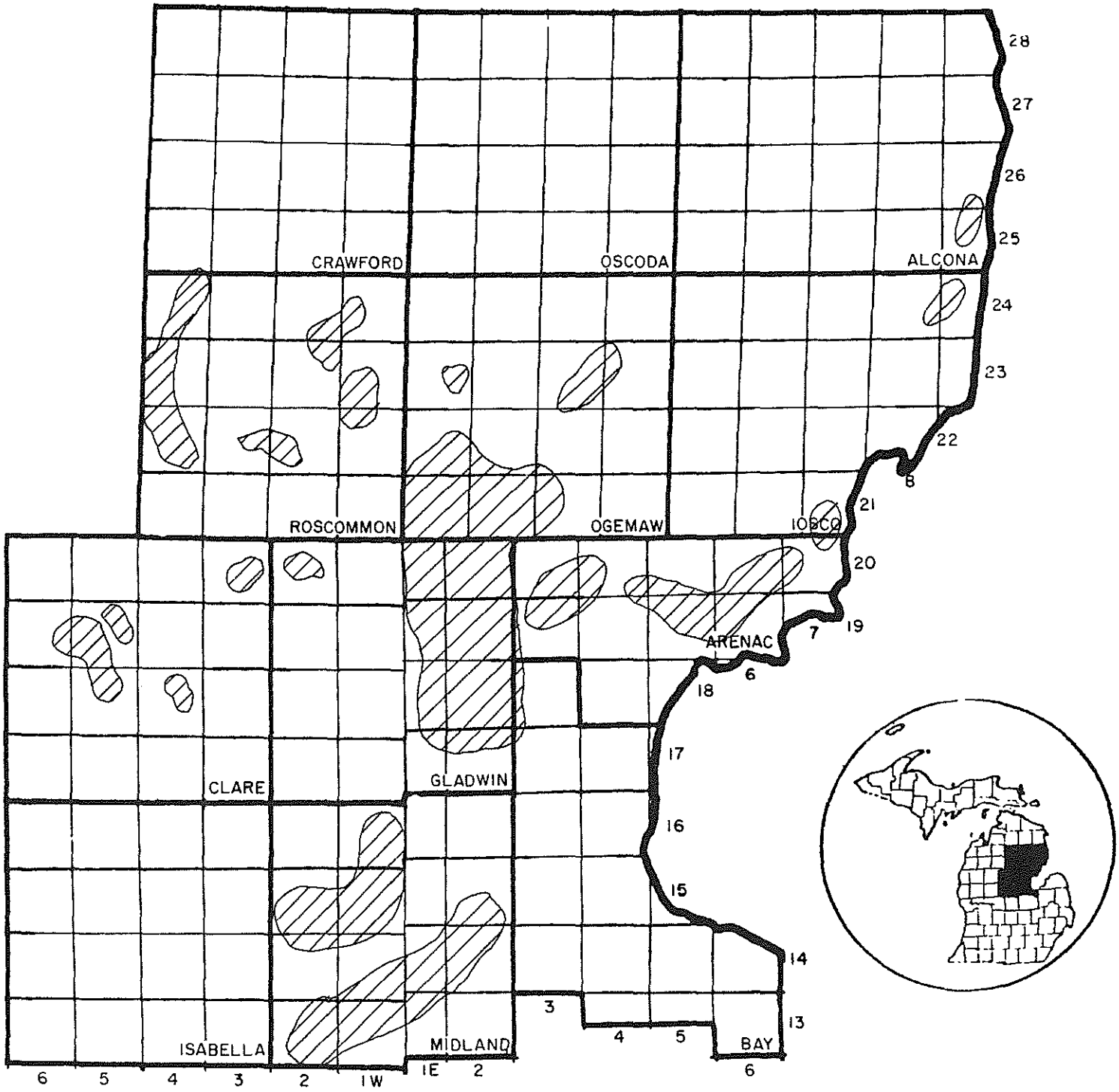
32 31 30 29 28 27 26 25 24 23 22 21 10 9 20 19 18 17 18 17 16 15

Key

aspen leaf rollers

elm spanworm

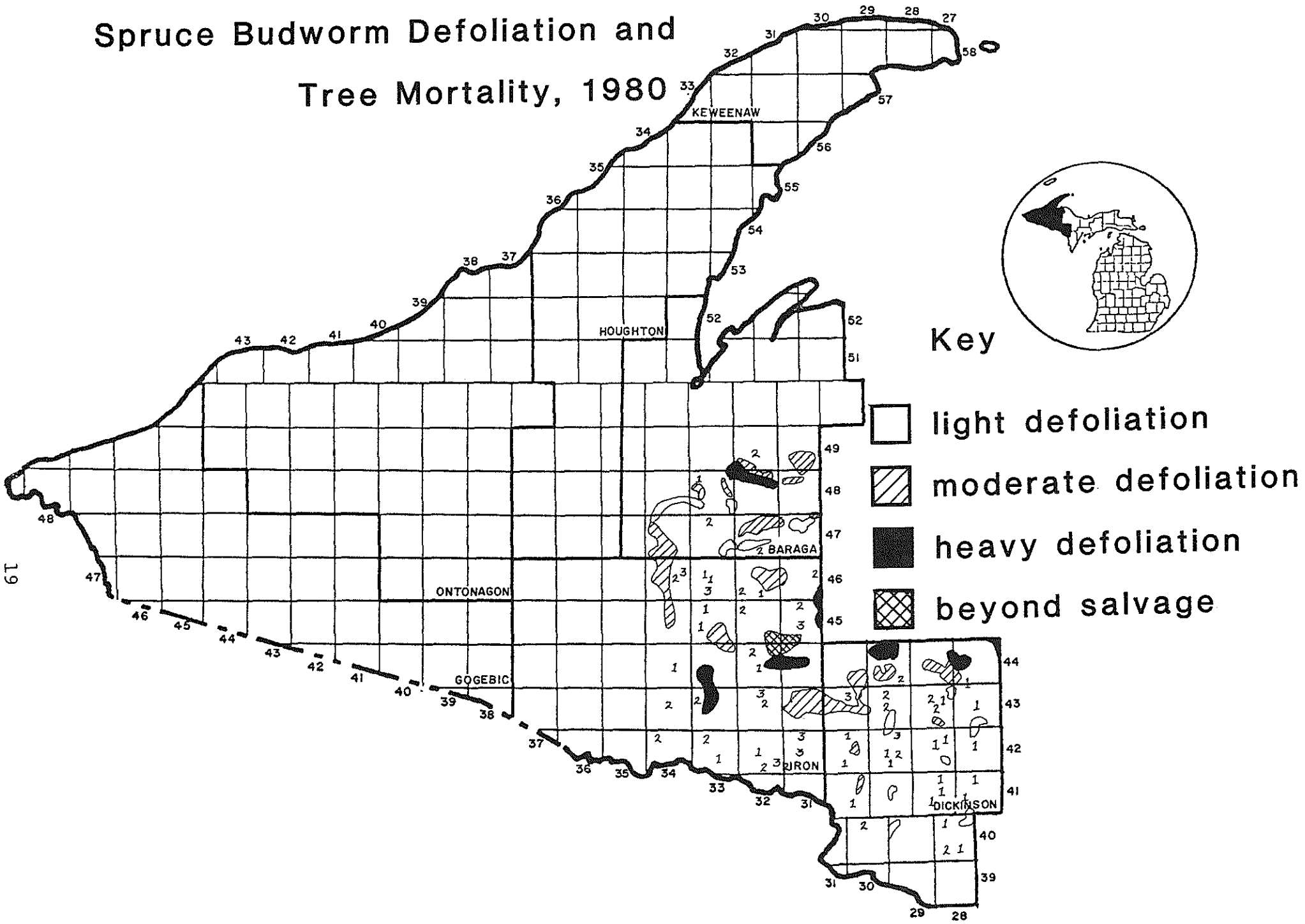
Aspen Leaf Rollers Defoliation, 1980



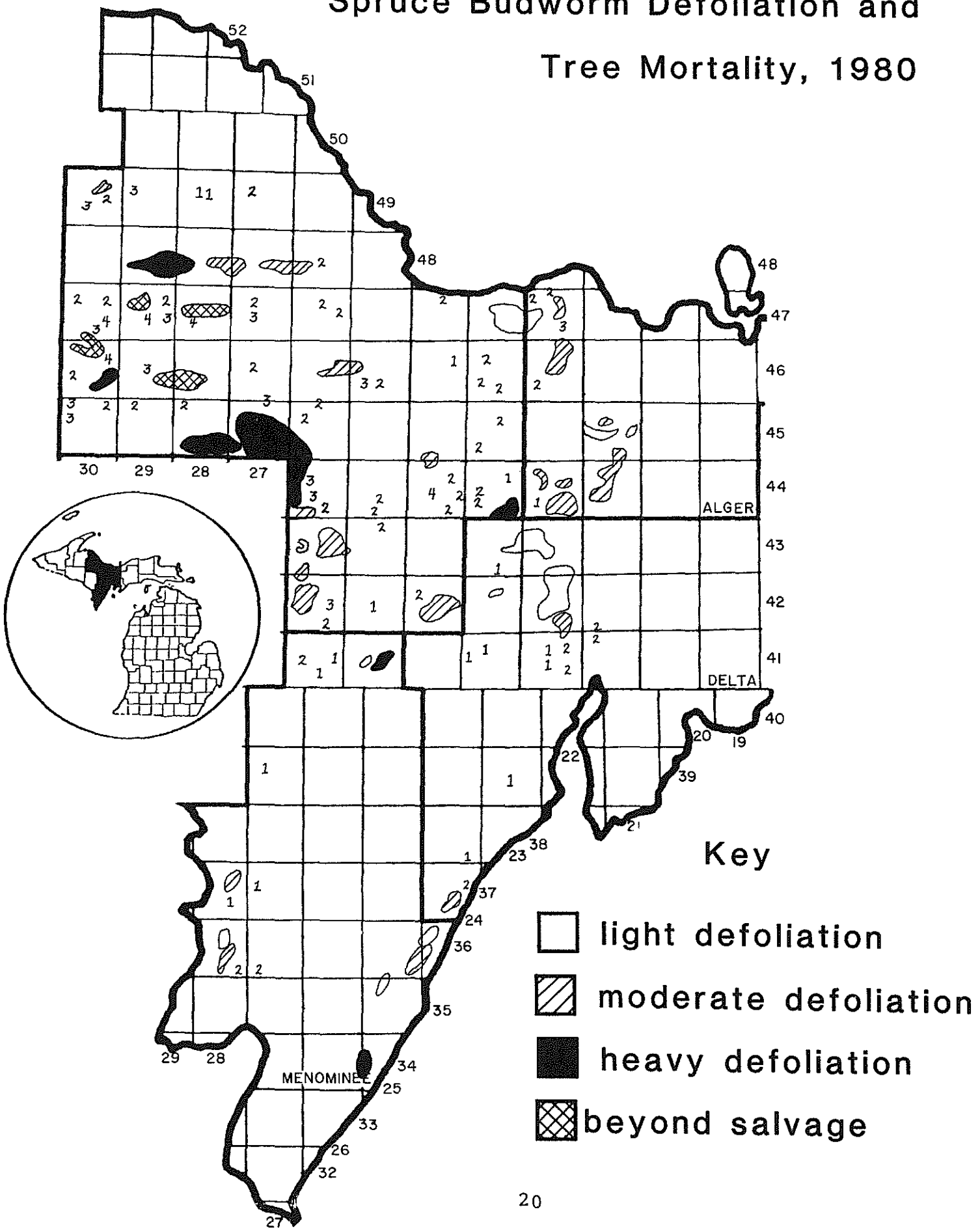
Key

aspen leaf rollers

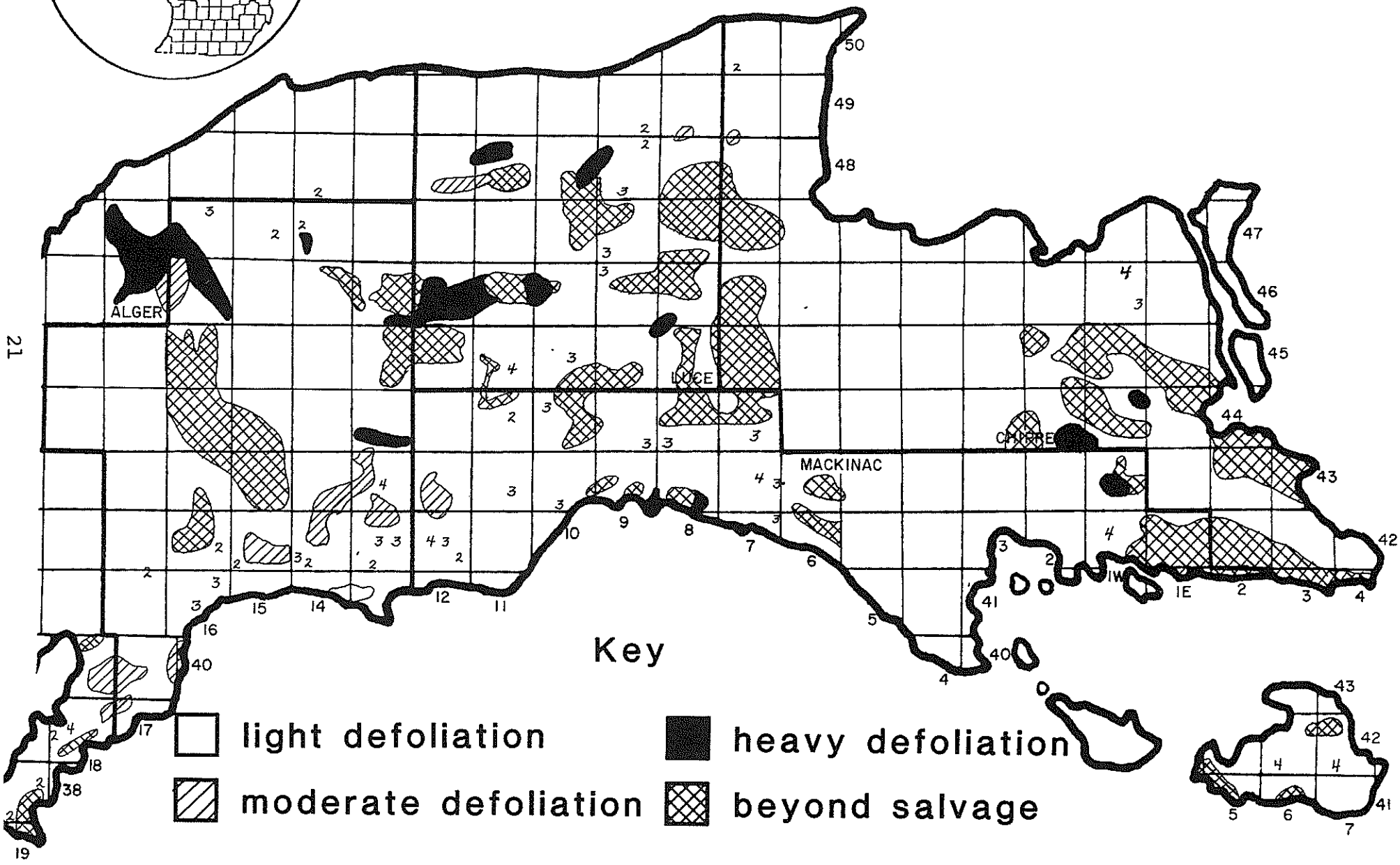
Spruce Budworm Defoliation and Tree Mortality, 1980



Spruce Budworm Defoliation and Tree Mortality, 1980



Spruce Budworm Defoliation and Tree Mortality, 1980



Elm Spanworm Defoliation, 1980

ALGER
LUCE
MACKINAC
CHIPPEWA

Key

elm spanworm

SURVEY AND MONITORING

WHITE PINE WEEVIL ON JACK PINE

Foresters have generally recognized for some time that white pine weevil damage is much more severe in some portions of the Northern Lower Peninsula that in others. During the winter of 1979-80, an attempt was made to delimit areas of varying degrees of damage on jack pine and make a broad assessment of the impact of that damage.

The white pine weevil zones shown on the attached map were developed as a result of that survey. Weevil damage to jack pine was categorized as:

Severe:

Stand is unmerchantable. Trees are too crooked and excessive numbers of large limbs in lower bole make production of roundwood and chips unprofitable to jobbers at any stumpage rate (including free). Volume losses are in the 45-60 percent range assuming the stand could be sold. Numerous cases are on record of jobbers forfeiting bonds of $50.00 or more and refusing to continue cutting sales of this type of timber with a stumpage rate as low as $0.50/cord. Financially such stands are earning negative rates of return of 8-10 percent. In stands sampled, 30-50 percent of the trees contained no merchantable volume at age 30 years. Such stands averaged one stick or less per tree with potential site indexes of 60 to 65 (based on conversion from nonsusceptible species).

Moderate-Severe:

Stands have more volume than severe stands. Losses are in the 25-30 percent range but numerous heavy lower limbs and crooked form leave serious doubt as to the saleability of the stand at any stumpage rate. Serious production difficulties would be encountered by jobbers in either roundwood or chipping operations.

Moderate:

Stands are merchantable with a significant reduction in stumpage rate to account for limby, crooked form. Volumes are reduced only by 25-30 percent from expected values. Although there are many limbs in the lower bole, they are not extremely large and could be handled in production by an added cost that jobbers are willing to pay in return for a reduced stumpage rate. Such stands are probably better suited for chipping than roundwood operations. Financially, rates of return are positive (although not ever as high as red pine, which is not weeviled significantly, on the same site).

Low:

Stands are merchantable with no significant reduction in form or volume attributable to the weevil.

The above categories were developed on the basis of a more detailed study conducted on six stands,20 to 30 years old, on a range of sites from very good to poor, exhibiting the severe and moderate damage characteristics. Care should be taken not to take these data for more than they are worth. Volume reductions, rates of return and merchantability of trees in the stand are based on this very small sample. The remainder of the 157 stands surveyed were classified on the basis of visual reconnaissance. This is a beginning only and stands within each category need to be studied further to refine this picture.

The deformity and growth loss exhibited in these stands was primarily, but not exclusively, associated with identifiable white pine weevil damage. Eastern gall rust was present in some of the stands but apparently accounted for only a small amount of the damage encountered except in two cases where it was the major cause of severe deformity. Damage caused by jack pine tip beetles, jack pine budworm, pitch midge, shoot moths, deer browse, porcupines, and ice damage was encountered but not seen as a major contributor to the general condition of the stands which with very few exceptions were apparently degraded primarily by the white pine weevil.

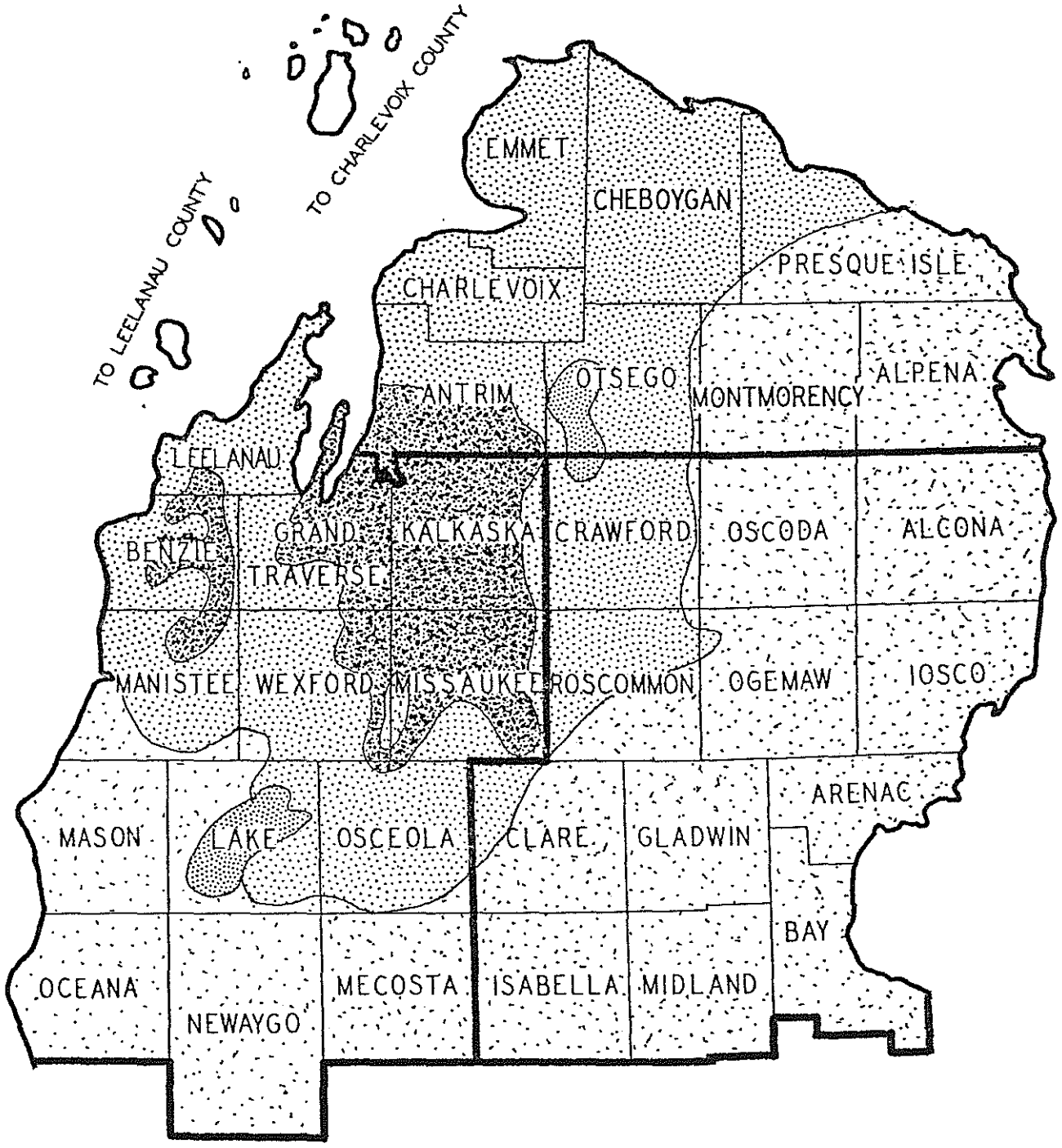
Since populations of white pine weevil tend to remain at relatively stable numbers once they have reached a particular level in a stand, it is resonable to assume that susceptible species (jack and white pines) planted in severe to moderate zones run a correspondingly high risk of being similarly damaged in the future.

SUMMARY TABLE

White Pine Weevil Damage on Jack Pine

(Region II)

Category of Damage	# Plantations	# Acres	% Plantations	% Acres
Severe	42	1,251	27	11
Severe-Moderate	16	1,117	10	10
Moderate	73	6,990	46	63
Low	26	1,788	17	16
TOTAL	157	11,146	100	100



FOREST MANAGEMENT REGION II *
1980 WHITE PINE WEEVIL HAZZARD ZONES FOR JACK PINE

SHADE	CLASS	DAMAGE
	3	SEVERE - (Most stands unmerchantable)
	Hi 2	MODERATE-SEVERE (Volume loss 30% to 60%)
	Low 2	MODERATE (Volume loss 30% to 60%)
	1	LOW - (Little or no damage)

* For State owned lands only

CARTOGRAPHIC SERVICES/

RESEARCH PROGRESS

PALES WEVIL (Hylobius pales)

During 1980, a research project on pales wevil was completed by the U.S. Forest Service, North Central Forest Experiment Station. Following are the conclusions and recommendations of the study.

The survival behavior responses of the pales weevil adults and the seasonal changes in attraction to freshly-cut stumps in Christmas tree plantations in Southeastern Lower Michigan affect the adult movements within a plantation and the adult population. In the spring when olfactory attraction to the stumps is the strongest, few adults are found on the trees at night. As the attractiveness of the stumps wears off in June, survival behavior responses, similar to those of the pine root collar weevil, become more dominant, and the adults aggretate beneath the trees during the day. During the night, especially when temperature is above 17°c, adults climb trees in large numbers and feed on the stem, branches and buds of the trees. These seasonal changes in adult locations can be used in the location and timing of pesticide applications. In the spring when adults are immediately around the stumps, pesticides can be applied to the area around the stumps. In the fall, when adults have moved to the trees, pesticides can be applied on the trees by mist blower or hydraulic sprayer. Making evening application when teperature is above 17°c would increase control effectiveness.

Control of the pales weevil is not always necessary because the impact of the adult on the marketability of Christmas trees varied depending on the time of year, tree species, adult population and method of harvest. Near harvest many of the needles drop off flagged shoots, especially on eastern white pine, reducing the impact of injury on the tree grades. In plantations where the owner selects trees for harvest, the impact of adult injury is also reduced, especially if trees are harvested in November and December. The impact on marketability is greater when trees are harvested by the "choose and cut" method, because of the greater selectivity of the public in choosing a tree for harvest.

Depending on the type of harvest method, the decision for control of the pales weevil should be based on tree appearance in the fall, rather than in the spring or summer. If the value of the trees is still low in the fall, then plans for the removal of or pesticide application to the new stumps should be made for the next spring. If severe damage appears in the summer from the previous year's adult injury, similar injury the next year can be recuced by an evening pesticide application to the trees in the fall. Leaving live branches on the stumps to prevent their use as breeding material can only be recommended if other pest problems that develop on these branches are not present. The live branches can then be used as "tip-ups" to produce new trees, or the stumps can be mechanically destroyed after harvest in the area is completed.

HYBRID ASPEN INTENSIVE CULTURE

Researchers at the North Central Forest Experiment Stations East Lansing, Michigan and St. Paul, Minnesota are currently investigating the role of insects and diseases and their interaction on nursery stock and intensive culture plantations of Populus. The study area is located on Packaging Corporation of America (PCA) land near Manistee, Michigan.

This study was started during the summer of 1980 and will end in 1984. The objectives are: 1) to census the insects and diseases of all PCA hybrid cottonwood plantations; 2) to research the bilogy, ecology, and behavior of specific pests that actual or potential problems to the plantings; 3) to determine insect and disease resistance and susceptibility to known clones; 4) to assess the damage and impact of injurious pest species; 5) to determine the interaction between specific insects and disease; and 6) to research and direct and indirect suppression and control measures for destructive pests.

The first objective was investigated during the summer of 1980. As a result of this investigation, four insects (Poplar-Gall Saperda, poplar and Willow borer, Snowy tree cricket, aphids), and three diseases, (Melampsora leaf rust, Marssonina leaf spot and Septoria leaf spot and canker), were found to be causing stunting, deformities, and mortality to PCA's nursery and clonal out-plantings. The biology, ecology, and behavior of these pests will be studied during the 1981 field season.

PILOT TESTS

HERBICIDE PILOT TEST

Sampling of 1979 test plots of herbicides Roundup and Krenite to eliminate host plants of Saratoga spittlebug in pine platations, conducted in June 1980, revealed no live plants within test areas. As the summer progressed, a few live plants were noted within test areas. No count records were taken of these since it was felt that the possibility of kill still existed in some cases. No serious reinvasion occurred in terms of numbers. Live plants consisted of one to a few per plot and were comprised of the following species; rubus, was noted first and came back into several of the plots in very small numbers. Some plants were runners from outside the plot and fell along the edges but quite a few were in the center portions of the plots as well; sweetfern had new sprouts from old root stock and apparently one was a new plant; carex and hawkweed were also in the plots.

Sampling scheduled for June 1981 will tell the story of whether any of these survived as by then all kill effect of the herbicides should be evident.

In general, we are still very hopeful that even if not all host plants are eradicated, the reduction in risk will be great enough and over a long enough time period to substantially increase the production potential from such stands.

JACK PINE PEST MANAGEMENT DEMONSTRATION AREA

The Michigan Department of Natural Resources and the U.S. Forest Service are making plans to establish a jack pine demonstration area in Kalkaska County. The objective is to show the impact on jack pine by several pests. A plot would be established in which white pine weevil, jack pine budworm, and other pests of jack pine (including weed and brush competition) would be controlled on a collective basis in an attempt to allow the jack pine to realize the potential of the site. In addition to demonstrating the impact of these pests, the plot should provide some broad basis for assessing potential for investments in control costs. The project will begin with site preparation and will continue until the stand has closed. A suitable site of 10-40 acres is being sought.

AERIAL APPLICATION OF ROUNDUP

A trial application of Roundup herbicide was applied on September 19, 1980 on 20 acres in Roscommon County, in an attempt to control brush competition and reduce risk of damage by Saratoga spittlebug via removal of alternate host plants. Two quarts of Roundup in 10 gallons of water per acre were applied using a DNR helicopter. The plantation selected for the test had a wide variety of the brush species and alternate host plants for Saratoga spittlebug typcial of many plantations throughout the Lower Peninsula. (Oak, willow, cherry, sweetfern, bracken fern, rubus sp., hawkweed). Twenty-one plots were established on which the above data were collected in addition to a camera point being taken to show prespray plot conditions. Similarly, twenty-one plots were established as a control. Measurements of tree height, percent survival, and effect of spray on trees in the plantation were taken for both the red and jack pine in this mixed plantation.

Spray application went well, despite a rainy week causing several days' delay in application. Weather that morning was sunny with no wind and temperatures between 50 and 60 F. Foliage was dry at the time of application and rain held off for 12 hours following completion. Winds increased to 5-10 mph as application neared completion. Some drift may have occurred onto the most easterly portion of the control area at this time. Test results will not be evident until June 1981.

REFORESTATION TRIALS IN THE SHINGLETON FOREST AREA

The purpose of this proposed cooperative project between Michigan State University and the Department of Natural Resources, is to determine the feasibility of reforesting areas within the Kingston Plains, Fox River Plains, Sucker River Plains, and Danaher Plains (approx. 75 sections). These areas once grew large white pine, however clearcutting and fires during the turn of the century left these sandy soils void of the little humus they had before logging. Plantation establishment in these areas has been hindered by this lack of top soil, harsh climate, grubs, scleoderris, and often by unknown factors.

The primary goal of this pilot test is to obtain techniques for quick establishment and rapid initital growth rate to eliviate the disease, insect and climatic problems in this area.

To return this area to productive forest land, the following site preparation and planting trails are suggested.

1. Herbicide treatments
2. Container (vs) bareroot
3. Species selection
4. Mycorrhizae inoculated seedlings

INFORMATION AND EDUCATION

OPERATIONS INVENTORY TRAINING

Operations inventory personnel in all forest areas have now received training on the use of the new Insect and Disease Coding System. The revised system provides a semi-quantitative estimate of damage symptoms without needing to recognize the cause(s) of a problem if not apparent. Stands with similar symptoms can be grouped to help delimit problem areas and evaluate problem magnitude on state lands.

Forest pest management concepts were incorporated into the training to give inventory personnel a more complete picture of stand condition. Two handouts were distributed as references; 1) "Forest Pest Management Guidelines" compiled by the Michigan Cooperative Forest Pest Management Team, and 2) A Guide to Common Insects and Diseases of Forest Trees in the Northeastern United States, U.S.D.A., Forest Service, FIDM, NA-FR-4.

PEST MANAGEMENT TRAINING

A program entitled "Recognizing and Managing Forest Pest Problems" was presented by the Cooperative Forest Pest Management Team, MSU Cooperative Extension Service, and Michigan Consulting Foresters Association at the Holiday Inn in Grayling May 28th. Thirty-four consulting foresters, industrial foresters, soil conservation foresters, CFM specialists from DNR, and members of the MSU Cooperative Extension Service attended the day long session. The program included training in pest identification and controlling pests through forest management. Comments following the session indicated it was well received and more training of this kind was requested.

HAZARD RATING SYMPOSIUM

A paper was presented by Bob Heyd, DNR Regional Pest Specialist, at the National Symposium on Hazard Rating Systems in Forest Pest Management in Athens, Georgia, on August 1. The paper was called "Risk-Rating Red Pine Plantations to Predict Losses From the Saratoga Spittlebug for Management Decisions" and was co-authored by Louis F. Wilson, U.S. Forest, East Lansing. Technology and theory concerning the development and application of hazard rating systems was presented and discussed at the symposium.